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A STUDY OF COMPARISION OF TIMI RISK SCORE AND GRACE RISK SCORE IN PATIENTS WITH NON ST ELEVATIONMYOCARDIAL INFARCTION

Medical Science

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ABSTRACT

NSTEMI is one of the common diagnosis encountered in emergency medical care. Its is prudent to develop a comprehensive risk assessment to categorise these patients to low, intermediate and high risk in order to plan proper management comparative studies to support choices between alternative strategies and evaluation of the impact of prognostic indexes on patient long term outcome is lacking. The present study was done to analyse the risk stratification and tocompare TIMI and GRACE risk scores in NSTEMI

KEYWORDS

Introduction:
Acute coronary syndrome (ACS) refers to a spectrum of clinical presentations ranging from ST-segment elevation myocardial infarction (STEMI) to presentations found in non–ST-segment elevation myocardial infarction (NSTEMI) or in unstableangina. Chest pain is the most common reason for emergency ambulance call-out.[1] ST elevation has high specificity butlow sensitivity for infarction, and three-quarters of those with acute coronary symptoms do not have ST elevation on presentation.[2] Risk stratification cannot therefore rely simply on the presence of ST elevation, and more accurate risk prediction tools like TIMI and GRACE risk scores are required

AIM AND OBJECTIVES
AIM
The aim of this study is to compare the performance of the TIMI and GRACE scores with respect to their discriminatory accuracy in risk stratification of NSTEMI patients and to evaluate their ability to predict hospitalization outcome along with 30 days outcome.

OBJECTIVES
To assess the TIMI risk score and GRACE risk score in NSTEMI.
To compare the TIMI risk score and GRACE risk score in predicting the severity and prognosis of NSTEMI. To compare the risk scores with respect to hospitalisation outcome and 30 days outcome.

METHODOLOGY
STUDY DESIGN
Prospective observational study
Place: Department of General Medicine and Cardiology, Sri Ramachandra medical college& RI
From January 2016- August2017.
Sample size: 150 patients

INCLUSION CRITERIA
All patients who fulfilled the criteria for NSTEMI that is clinical symptoms, ECG changes and elevated cardiac markers like troponin I, troponin T, BNP were included in the study.

EXCLUSION CRITERIA
Patients with ST elevation myocardial infarction (STEMI), new left bundle branch block on ECG, prior revascularization (eithersurgical percutaneous) and definitive non-ischaemic etiology for their chest pain at the time of presentation were excluded.

PROCEDURE
Data was collected prospectively between the months of January 2016 to August 2017. Patient demographics and clinical data was recorded from oral questionnaires and hospital records and recorded into an excel case sheet.

Basic laboratory tests like CBC, RFT, LFT along with cardiac markers which were done were recorded along with the ECG findings in the individual proforma for each patient.

TIMI and GRACE risk scores were calculated from the initial clinical history, electrocardiogram and laboratory values collected on admission. The lab reference values are as follows troponin-I- 0.04, troponin-T <10.

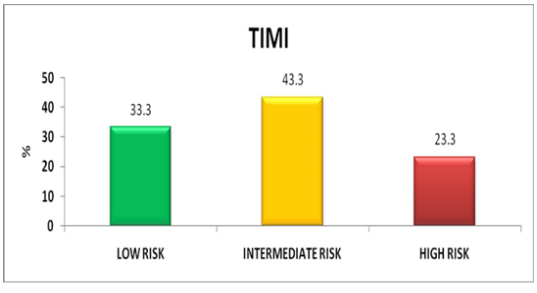
FOLLOW UP
Cases included in the study were followed up regularly. ICU stay, hospital stay and intervention results were noted during in-hospital stay. Patients were followed up for a period of 1 month from the date of index admission, by telephone interview to detect major complications during the past period or the occurrence of all cause mortality for 1 month from the date of admission.

RESULTS
A total of 150 patients were included in the study.

Sex Distribution
Out of the 150 patients,112 (74.7%) were males and 38(25.3%) were females

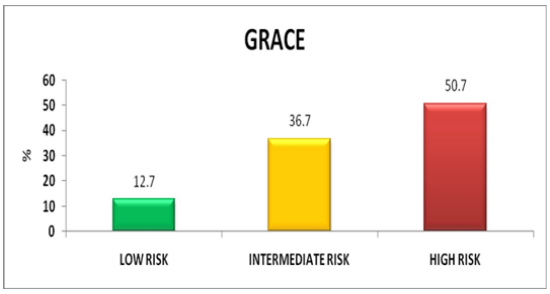
Risk stratification according to TIMI score
50 patients(33.3%) fell in low risk group, 65 patients (43.3%) fell in intermediate risk group and 35 patients (23.3%) fell in high risk group as per the TIMI risk score.

Figure:1



Risk stratification according to GRACE risk score
19 patients (12.7%) fell in low risk group, 55 patients (36.7%) fell in intermediate risk group and 76 patients(50.7%) fell in high risk group.

Figure:2



In Hospital Outcome
Out of the 150 patients, 133 patients recovered, 10 patients went AMA, and 7 patients died.

30 Days Outcome
Out of 150 patients, 136 patients are alive after 30 days.

Correlation of TIMI RISK score and In- Hospital Outcome
11.4% of high risk group died, whereas only 2% of low risk group died in hospital.

Correlation of TIMI RISK score and Outcome at 30 days
Patients in low risk group had lesser mortality at 30 days (6%) compared to high risk group which had 14.3% mortality.

Correlation of GRACE RISK score and in hospital outcome
6.6% of high risk group died in hospital whereas there were no deaths in low risk group.

Correlation of GRACE RISK score and outcome at 30 days
15.8% of high risk group died at 30 days wheras there were no deaths in the low risk group.

Table 1- Risk Scores and Mean Hospital Stay

TIMI RISK SCORE	N	Mean	Std. Deviation
LOW RISK	50	5.80	6.158
INTERMEDIATE RISK	65	6.35	5.188
HIGH RISK	35	5.74	4.210
Total	150	6.03	5.307
GRACE RISK SCORE			
LOW RISK	19	4.16	3.236
INTERMEDIATE RISK	55	5.38	5.411
HIGH RISK	76	6.96	5.503
Total	150	6.03	5.307

Mean hospital stay was highest for Intermediate riskgroup in TIMI risk score and highest for High risk group inRACE risk score.

Comparison of mean TIMI AND GRACE risk scores with Outcome

Mean TIMI and GRACE risk scores were highest for patients who died compared to the patients who are alive.

Receiver Operator Characteristics for In- Hospital and 30days TIMI and GRACE risk scores

The area under the curve was marginally higher for TIMI risk score (0.681) compared to GRACE risk score (0.650) for In-Hospital outcome but there is no statistical significance.

The area under the curve was higher for GRACE risk score (0.747) compared to TIMI risk score (0.585) for 30 days Outcome and is statistically significant. (p=0.002)

Table: 2

Mortality-in-hospital	Area	Standard Error	Significance p-value
TIMI GRACE	.681 .650	.098 .074	.107 .180
Mortality- 30 days	Area	Stdandard Error	Significance p-value
TIMI GRACE	.585 .747	.081 .055	.295 .002

T calibration of TIMI and GRACE scores for prediction of mortality among the study group

The hosmer and lemes how test was applied to TIMI and GRACE scores. There was no statistically significant difference between predicted and observed mortality in both in-hospital and 30 days outcome for TIMI RS which indicates proper calibration of TIMI RS.

There was statistically significant difference between observed and predicted mortality for In-Hospital mortality for GRACE score (<0.001) indicating poor calibration but there was no statistically significant difference for 30 days mortality.

DISCUSSION

A comprehensive analysis of risk stratification in NSTEMI was done in this study. Two important risk scores of prediction of mortality in NSTEMI; TIMI and GRACE were analysed for both in hospital and 30 days outcome. A total of 150 patients were studied in detail.

TIMI RISK SCORE AND OUTCOME

In the present study high TIMI risk score group had a higher in-hospital mortality (11.4%) compared to low risk group(2%).Outcome at 30 days was in correlation with the above which showed14.3% deaths in high risk group and 6.0% deaths in the low risk group. It has been observed that mortality rate increases with increasing TIMI risk score for both in hospital and 30 days.

In the present study the percentage of patients in the intermediate risk group (65) is highest which is not statistically significant (p=0.434) and is consistent with study conducted by Ramsay et al[8]

GRACE RISK SCORE AND OUTCOME

GRACE RISK score correlated well with in- hospital and 30 days mortality.

There were no deaths in low risk group both in- hospital and 30 days. There were no new deaths in the intermediate group after 30 days. All the 7 new deaths at 30 days were in the high risk group. With increasing GRACE risk score the mortality was increasing.

Our study was having lowest percentages in low risk group and the highest in high risk group which was similar to a study by Emad Abu Assi *et al* (3641 patients)[9]

COMPARISON OF GRACE AND TIMI RISK SCORES

Risk distribution differed significantly for the two scoring systems. The TIMI score classified more patients as low risks (33.3% vs. 12.7% GRACE) and fewerpatients as high risk (23.3% vs. 50.7% GRACE) which is not consistent with the findings in a study by Ramsay *etal*[8].

From the above findings it can be said that higher the TIMI and GRACE risk scores higher is the probability of mortality. Similar findings were reported in other studies which showed that death increases with higher TIMI[10,11] and GRACE risk scores[12,13].

Risk scores which distinguish well between patients who die and those who survive are said to have good discrimination.

In the present study TIMIRS and GRACERS were tested for discrimination by c statistics, which is equivalent to the area under the receiver operating characteristics. the discriminative power of models are good if area under the ROC curve is more than 0.65 to 0.75.[14] in our study TIMI RS has higher area under the curve (0.681) compared to the GRACE RS (0.650) for in-hospital mortality which is not staistically significant. but for 30 days GRACERS has a statistically significant (p=0.002) area under the curve(0.747) compared to the area under TIMI RS(0.585).

Other studies have reported superiority of GRACE RS over TIMI RS for predicting in- hospital as well as long term mortality.[15,16]

Results of the present study showed there was no statistically significant differences betweenobserved and predicted mortality for TIMI RS where as there was a statistically significant difference between predicted and observed in-hospital mortality for GRACERS indicating poor calibration. However a canadian study,[17] conducted in 2009 reported suboptimal overall calibration of GRACE RS.

The disparity between present study and other international studies regarding GRACE RS calibration may be attributed to the smaller sample size and minimal mortality that resulted in clustering of mortality cases only in the intermediate and high risk of GRACERS. This concentration of observed mortality in a narrow spectrum of GRACE RS increased the like lihood of occurrence of significant difference between the observed and predicted mortality.

STRENGTHS AND LIMITATIONS OF THE STUDY

The present study was an observational study in an unselected population. It reflects the observations seen in a practical clinical setting which is of importance. There were a few limitations of the study. The sample size was small which could have affected the final outcome of the study.

CONCLUSION

Both the TIMI risk score and the GRACE risk score can be applied to unselected patients with suspected cardiac pain to identify those individuals at higher risk of major cardiac events. The GRACE risk score was superior to the TIMI risk score in predicting long term outcome (30 days). With regard to In-hospital mortality, both scoring systems were superior to clinical parameters. Inclusion of few parameters in TIMI risk score as discussed could improve the predictability of TIMI risk score. GRACE RS can be used as an important tool in decision making for patients with NSTEMI when used along with good clinical judgement but further research is necessary to re-asses GRACE RS using larger sample size.

ABBREVATIONS

ACC = American College Of Cardiology;
ACE = Angiotensin-Converting Enzyme;
ACS = Acute Coronary Syndrome;
AD = Adenosine Diphosphate;
AHA = American Heart Association;
AMA = Against Medical Advice
BNP = B-Type Natriuretic Peptide;
CABG = Coronary Artery Bypass Grafting;
CAD = Coronary Artery Disease;
CHF = Congestive Heart Failure;
CK-MB = Muscle And Brain Fraction Of Creatine Kinase;
CRP = C- Reactive Protein;
CURE = Clopidogrel In Unstable Angina To Prevent Recurrent Events;
ECG = Electrocardiography;
ED = Emergency department;
ER = Emergency Room;
GP = Glycoprotein;
GRACE = Globalregistry of acute coronary events